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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/729,960 | TOMITA ET AL. | |
| | Examiner | Art Unit | |
| | Janis L. Dote | 1756 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *03 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *14-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-13* is/are rejected.

7)☒ Claim(s) *8* is/are objected to.

8)☒ Claim(s) *1-29* are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/9/04;11/22/04;*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Applicants' election of May 3, 2006, in the reply filed on May 3, 2006, is acknowledged. Because applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 14-29 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on May 3, 2006.

3. The US patents listed in the "List of related cases" in the Information Disclosure Statements (IDS) filed on Mar. 9, 2004, have been crossed out by the examiner because the references are already listed on the form PTO-1449 filed on Mar. 9, 2004.

The US applications 06/675,329 and 06/825,998 listed in the "List of related cases" in the IDS filed on Mar. 9, 2004, have been crossed out by the examiner because legible copies of those portions of the copending U.S. applications which caused them to be listed, as required under 37 CFR 1.98(a)(2)(iii), were not present in the instant application.

4. The examiner has considered only the material submitted by applicants, i.e., copies of the originally filed claims, abstracts, and figures, of the US applications listed in the "List of related cases" filed in the IDS on Mar. 9, 2004.

The examiner has considered the US applications listed in the "List of related cases in the IDS's filed on Nov. 11, 2004, Dec. 14, 2004, Jan. 19, 2005, Jun. 27, 2005, and Sep. 7, 2005.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

In Fig. 2D, the reference sign **502**. See the instant specification, page 74, lines 19-20, which describes the "photoconductive layer **502**" in Fig. 2D.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

In Fig. 3, reference characters **11**, **13**, **15**, **16**, and **17**. See the instant specification, pages 79-80.

In Fig. 4, reference characters **11**, **12**, **27**, **28**, and **29**. See the instant specification, pages 81-82.

In Fig. 5, reference characters **11**, **12'**, **27**, **28**, and **29**. See the instant specification, pages 82-84.

In Fig. 6, reference characters **10**, **11**, **12**, **13**, and **14**. See the instant specification, pages 86-87.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. The disclosure is objected to because of the following informalities:

(1) There appear to be numerous misspellings throughout the instant specification. For example, "bet fixing device"

(emphasis added) at page 17, line 22. This example is not exhaustive. Applicants should review the entire specification.

(2) The instant specification at page 79, line 6, describes Fig. 4 as showing "an image developing device." However, the image developing device is shown in Fig. 3. See the instant specification, page 18, lines 2-3.

(3) The instant specification at page 81, line 3, describes Fig. 5 as showing "an example of the image-forming apparatus having a contact charger." However, the image-forming apparatus is shown in Fig. 4. See the instant specification, page 18, lines 4-5.

(4) In Table 1 at page 111, in all of the values listed for G'(80°C) and for G'(180°C), the third number following the number "10," for example "10<u>6</u>" (emphasis added), should be superscripted, for example, $10^6$.

(5) The use of trademarks, e.g., Henschel mixer [sic: HENSCHEL MIXER] at page 94, line 5, has been noted in this application. The trademarks should be capitalized wherever they appear and be accompanied by the generic terminology. This example is not exhaustive. Applicants should review the entire specification for compliance.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be

respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Appropriate correction is required.

8. The examiner notes that the instant specification at page 38, line 16, to page 39, line 5, discloses that the parameter SF-1 recited in the instant claims is determined from the following equation:

$$SF\text{-}1 = [(MXLNG)^2/AREA] \times (100\pi/4)],$$

where MXLNG is an "absolute maximum length of the toner particle and AREA is a projected area of the toner particle.

The examiner also notes that the instant specification defines the phrase "applied with oil in an amount of 4 mg or less per A4 size" recited in instant claims 1 as meaning that "the application of oil to the surface of the belt heat-transfer medium is in the range of from 0 to 4 mg per A4 size, which includes the case that no oil is applied at all."

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Instant claim 13 is indefinite in the phrase "a step of supplying a toner to a latent electrostatic image formed on the photoconductor and applying an alternating field so that a toner image is formed to develop the latent electrostatic image" (emphasis added) for lack of unambiguous antecedent basis for the terms "a toner" and "the photoconductor" in claim 1, from which claim 13 depends. Claim 1 does not recite a step that requires the use of a photoconductor. It is also not clear whether the term "a toner" refers to the toner recited in instant claim 1 or to another toner. The phrase is further indefinite because it is not clear how a toner image develops the latent electrostatic image when it is well known in the art that it is a toner that develops an electrostatic latent image to form a toner image. See the instant specification, page 1, lines 14-19.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f), or (g) prior art under 35 U.S.C. 103(a).

13. US 2003/0027074 A1 (Emoto'074) was published on Feb. 6, 2003, and has an effective filing date of Jul. 5, 2002, which are both prior to the instant application's filing date of Dec. 9, 2003. Thus, Emoto'074 qualifies as prior art under 35 U.S.C. 102(a), as well as, under 35 U.S.C. 102(e). Accordingly, Emoto'074 also qualifies as prior art under 35 U.S.C. 103(c). Rejections based on Emoto'074 are set forth in infra.

14. Claims 1-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emoto'074 combined with:
(1) WO 02/056116 (Emoto'116), as evidenced by US 2004/0053155 A1 (US'155); (2) Japanese Patent 2000-267331 (JP'331);
(3) US 2003/0113650 (Suwabe); and (4) US 5,797,070 (Waki).

See the Japanese Patent Office (JPO) machine-assisted translation of JP'331 for cites.

The US published application (US'155), filed under 35 U.S.C. 371, is the national stage of the WO application of Emoto'116, and therefore is presumed to have been an accurate English-language translation of the WO application of Emoto'116. See US'116 for cites.

Emoto'074 discloses an image forming method comprising the step of oil-less fixing a toner image on a recording medium with a fixing unit comprising an endless fixing belt **3** that is heated by a heating roller **1** comprising a heater **5** and a pressure roller **4**. Fig. 1 and paragraphs 0124-0127 and 0330. Because the fixing step requires zero amount of oil applied to the surface of the endless fixing belt **3**, it meets the limitation applying "oil in an amount of 4 mg or less per A4 size" as recited in instant claim 1. Compare paragraph 8 supra.

Emoto'074 discloses that the toner image is formed with a toner comprising toner particles that comprise a colorant, a

binder resin, and a wax as a releasing agent. Example 1 in paragraphs 0242-0245 and in Table 1 at page 21. The wax has a melting point of 81°C and is present in an amount of 14% by weight based on the total weight of the toner particles. The wax amount of 14% by weight was determined from the information provided in example 1. The wax is dispersed as particles in the toner particles. The dispersed wax particles have a dispersed particle diameter of 0.1 to 2 μm accounting for 90% of all of the wax particles. The wax particles are dispersed in the toner particles as shown in Fig. 5, which shows that the wax particles are concentrated in the vicinity of the surface of the toner particles as observed with a transmission electron microscope (TEM). See paragraphs 0193-0195. The Emoto'074 wax meets the releasing agent limitations recited in instant claims 6 and 7. The binder resin comprises a urea-modified polyester resin and an unmodified polyester resin. The binder resin comprises a tetrahydrofuran-soluble component that exhibits a main peak at 4000 and a number-average molecular weight of 2500. The binder resin has a Tg of 60°C and an acid number of 7 mg KOH/g. Paragraph 0150, lines 6-10; and Table 1. The Emoto'074 binder resin in example 1 meets the binder resin compositional limitations recited in instant claims 9-12. Emoto'074 further teaches that the toner can be made by using the process steps

recited in the product-by-process limitation of instant claim 12. See paragraph 0216.

The Emoto'074 toner particles have a mean roundness of 0.96 and a weight average particle size of 6 μm. See Table 2 at page 21, example 1. The weight average particle of 6 μm is within the range of 3.0 to 7.0 μm recited in instant claim 1. Emoto'074 also exemplifies toner particles having a weight average particle size of 5 μm, which is within the range of 3.0 to 5.0 μm recited in instant claim 2. See the toner in example 6 at paragraph 0267.

Emoto'074 does not disclose that its toner particles have the particle distribution of the weight-average particle diameter (Dv) to the number-average particle diameter (Dn), i.e., Dv/Dn, of 1.00 to 1.25 recited in instant claim 1. Nor does Emoto'074 disclose that its toner particles have an average shape factor SF-1 of 100 to 150 and contain particles having a shape factor SF-1 of 160 or more in an amount of 10% by number or less as recited in instant claim 1.

Emoto'116 teaches toner particles having a preferred weight-average particle diameter (Dv) of 3.0 to 6.0 μm and a particle distribution Dv/Dn of 1.00 to 1.15. See US'155, paragraph 0045, lines 11-14. According to Emoto'116, the toner provides high quality images with high resolution. US'155,

paragraph 5-10. The particle distribution Dv/Dn is within the ranges recited in instant claims 1 and 3. The lower endpoint 3.0 μm, of the preferred weight average particle diameter range 3.0 to 6.0 μm is within the range of 3.0 to 5.0 μm recited in instant claim 2. Accordingly, the prior art appears to recognize the weight average toner particle size and toner particle distribution Dv/Dn as result-effective variables. The variation of a result-effective variable is presumably within the ordinary skill of a person in the art.

As discussed above, the Emoto'074 toner particles have a mean roundness of 0.96. According to Emoto'074, if the mean roundness is smaller than 0.96, the toner particles are far from spheres. Paragraph 0238, lines 4-5. Waki discloses that it is advantageous for spherical toners to have a shape factor SF-1 of 100 to 180, preferably from 100 to 140, most preferably from 100 to 130. Col. 8, lines 8-27. The Waki shape factor SF-1 is determined in the same manner as recited in the instant claims. See paragraph 8 above. The preferred and most preferred SF-1 ranges meet the SF-1 ranges recited in instant claims 1 and 4, respectively. Waki discloses that the shape factor SF-1 represents the degree of sphericity of the toner, and a shape factor SF-1 closer to 100 means that the shape of the toner particles is closer to a sphere. Col. 8, lines 29-32. Thus, it

appears that the shape factor SF-1 and the average roundness required by Emoto'074 are related to each other with respect to the spherical shape of the toner particles.

JP'331 and Suwabe each teaches toner particles having an average shape factor SF-1 of 125-140. See JP'331, page 2, col. 1, lines 7-9; and the JPO translation, claim 1, and paragraphs 0016, item (ii). Also see Suwabe, paragraphs 0100 and 0101. Both the JP'331 and Suwabe shape factors SF-1 are determined in the same manner as recited in the instant claims. Compare JP'331, page 2, col. 1, lines 7-9, and Suwabe, paragraph 0101, with paragraph 8, supra. The shape factor SF-1 range of 125 to 140 is within the SF-1 range recited in instant claim 1 and within the preferred ranges disclosed by Waki. The SF-1 range of 125 to 140 overlaps the range of 100 to 130 recited in instant claim 4. The lower endpoint, 125, of the range 125 to 140 is within the shape factor range recited in instant claim 4.

JP'331 further teaches that its toner particles comprise particles having a shape factor SF-1 of 120 or less in an amount of 20% by number or less and particles having a shape factor of 150 or more in an amount of 20% by number or less. See the JPO translation, claim 1, items (d) and (e), and paragraph 0016, item (iii).

According to JP'331, if the shape factor SF-1 exceeds 140, the fluidity of the toner decreases and the "imprint nature" of the toner is badly influenced. JPO translation, 0025, lines 4-6. According to Suwabe, if the shape factor SF-1 exceeds 140, the fluidity of the toner is lower, which "adversely affects the transferability from the start." Suwabe also teaches that if the shape factor SF-1 is less than 125, inferior toner cleaning occurs. Suwabe, paragraph 0102.

JP'331 further teaches that if the amount of toner particles having an SF-1 of 120 or less exceeds the amount of 20% by number, satisfactory toner cleaning can not be maintained for a long period of time. If the amount of toner particles having an SF-1 of 120 or less exceeds the amount of 10% by number, poor cleaning may occur and machine contamination may occur. JPO translation, paragraph 0026, lines 1-3, and paragraph 0029, lines 1-2. JP'331 also teaches that if the amount of toner particles having an SF-1 of 150 or more exceeds the amount of 20% by number, satisfactory "imprint" cannot be maintained for a long period of time. If the amount of toner particles having an SF-1 of 150 or more exceeds the amount of 10% by number, "imprint unevenness at the time of imprint may occur." JPO translation, paragraph 0026, lines 4-6, and paragraph 0029, lines 4-6. JP'331 exemplifies toner particles

having an SF-1 of 126 and comprising particles having an SF-1 of 120 or less of 12.5% by number and particles having an SF-1 of 150 or more of 5.2% by number. See the JPO translation, Table 1, example 9. According to JP'331, the toner in example 9 provides images with no unevenness of "imprint" and no white omissions, i.e., good cleaning property. JPO translation, paragraph 0120 and Table 2, example 9.

Accordingly, the prior art appears to recognize the shape factor SF-1, the amount of particles having a shape factor SF-1 of 120 or less, and the amount of particles having a shape factor SF-1 of 150 or more as result-effective variables. The variation of a result-effective variable is presumably within the ordinary skill of a person in the art.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Emoto'116, Waki, JP'331, and Suwabe, to adjust, through routine experimentation, the particle size and the shape of the Emoto'072 toner particles in example 1, such that the resultant toner particles have the roundness required by Emoto'072, the weight-average particle size and particle distribution as recited in instant claims 1-3, the shape factor SF-1 recited in the instant claims, and comprise the amount of particles having a shape factor SF-1 of 150 or more as recited in instant claims 1 and 5. It would have

also been obvious to that person to use the resultant toner particles in the image forming method disclosed by Emoto'074. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides fixed high quality images with high resolution and with no unevenness of "imprint" and white omissions.

15. Claims 1-5, 9, and 11 are rejected under 35 U.S.C. 103(a) as unpatentable over US 6,586,147 B2 (Iida) combined with JP'331, Suwabe, Waki, and US 2001/0003562 A1 (Hachisuka). See the JPO translation of JP'331 for cites.

Iida discloses an image forming method comprising the step of oil-less fixing a toner image on a recording medium with a fixing unit comprising a pair of rollers that comprise a fixing roller and a pressure roller. The toner image is formed by forming an electrostatic latent image on a photoconductor, developing the latent image with a two-component developer comprising a magnetic carrier and a toner, and transferring the developed toner image to the recording medium. Col. 3, lines 5-8; col. 16, line 21, to col. 17, line 33; col. 24, lines 30-63; and example 9 at col. 26 and in Tables 4-2 and 4-3 at cols. 29 and 31, respectively. Because the fixing step requires zero amount of oil applied to the surface of the fixing

roller, it meets the limitation applying "oil in an amount of 4 mg or less per A4 size" as recited in instant claim 1. Compare paragraph 8 supra.

The toner image in example 9 of Iida is formed with a toner comprising toner particles having a weight average particle size D4 of 4.1 μm and a number average particle size D1 of 3.9 μm. Col. 11, lines 12-15; and Table 4-3, example 9. The ratio of D4/D1 is 1.05, which is within the particle distribution ranges recited in instant claims 1 and 3. The weight average particle size of 4.1 μm is within the weight average particle size ranges recited in instant claims 1 and 2. The Iida toner particles comprise a colorant, a binder resin, and a wax as a releasing agent. Col. 24, lines 5-10 and example 9. The binder resin comprises hybrid resin **1** that comprises polyester units and vinyl copolymer units. The binder resin comprises a tetrahydrofuran-soluble component that exhibits a main peak at 15,400 and a number-average molecular weight of 3,100. The binder resin has an acid number of 28.1 mg KOH/g. See Table 2 at col. 23, hybrid resin **1**. The Iida binder resin in example 9 meets the binder resin limitations recited in instant claims 9 and 11.

Iida does not disclose that its toner particles have an average shape factor SF-1 of 100 to 150 and contain particles

having a shape factor SF-1 of 160 or more in an amount of 10% by number or less as recited in instant claim 1.

JP'331 and Suwabe each teaches toner particles having an average shape factor SF-1 of 125-140. JP'331 further teaches that its toner particles comprise particles having a shape factor SF-1 of 120 or less in an amount of 20% by number or less and particles having a shape factor of 150 or more in an amount of 10% by number or less. The discussions of Suwabe and JP'331 in paragraph 14 above are incorporate herein by reference.

Waki discloses that spherical toner particles that have a shape factor SF-1 of 100 to 180, preferably 100 to 140, can be produced by heating a pulverized toner prepared by melting, blending, pulverization, and classification; or by treating a pulverized toner "by application of impact to the toner particle surface." Waki, col. 8, lines 9-27 and 50-56. The toner in example 9 of Iida is obtained by a melt kneading-pulverization method.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'331, Suwabe, and Waki, to adjust, through routine experimentation, the shape of the Iida toner particles by further processing the toner particles as taught by Waki, such that the resultant toner particles have a shape factor SF-1 and comprise the amount of

particles having a shape factor SF-1 of 150 or more as recited in instant claims 1, 4, and 5. It would have also been obvious to that person to use the resultant toner particles in the image forming method disclosed by Iida. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides fixed toner images with no unevenness of "imprint" or white omissions.

Iida does not exemplify a fixing unit comprising a belt heat-transfer medium as recited in instant claim 1. As discussed supra, Iida exemplifies the use of a fixing unit comprising a fixing roller and a pressure roller.

According to Hachisuka, in a conventional fixing unit, such as that exemplified by Iida, the rollers form a nip in which the recording sheet comprising the toner image is conveyed to fix the image. In such a heat roller mechanism, the "melted toner is inevitably separated from the fixing roller before it is sufficiently cooled off. Accordingly, an offset phenomenon is prone to be caused in which the toner is erroneously deposited on the surface of the fixing roller." Hachisuka, paragraph 0005. Hachisuka discloses that in a belt-type fixing mechanism, the "fixing belt . . . has a far smaller heat capacity than the fixing roller type fixing mechanism and, therefore, the fixing belt can rapidly be cooled off during the

time when it [the toner image on the recording sheet] is moved to pass through the fixing nip, resulting in an accurate prevention of the offset phenomenon." Paragraph 0008.

Hachisuka teaches a fixing unit that comprises a fixing roller **402**, a heat roller **406**, which is internally heated with a halogen heater **404**, and a seamless fixing belt **408**, which is held in tension between the fixing roller **402** and the heat roller **406**. The fixing unit further comprises a pressure roller **412**. Fig. 5 and paragraphs 0099. The heat roller **406** heats the fixing belt **408**. The recording sheet with the toner image is conveyed through a first nip **N1** formed between the fixing belt **408** and the pressure roller **412** and then through a second nip **N2** formed between the fixing roller **402** and the pressure roller **412** via the fixing belt **408**. Paragraph 0101. The Hachisuka fixing unit meets the fixing unit elements recited in instant claim 1. According to Hachisuka, its fixing unit is capable of effectively performing an image fixing process. Paragraph 0003. Hachisuka further teaches that because the first fixing nip **N1** has a comparatively lower fixing pressure, the recording sheet is smoothly conveyed through nip **N1** without making wrinkles. Paragraph 0108. According to Hachisuka, "[s]ince heat capacity of the fixing belt **408** is relatively low, the fixing belt **408** rapidly decrease its temperature at an area

around the exit of the fixing process area **N2**. This causes an advantageous cooling effect by which the fixing belt **408** is protected from an offset problem in which the fixing belt **408** is deposited by the toner." Paragraph 0109.

It would have been obvious for a person having ordinary skill in the art to use the Hachisuka fixing unit as the fixing unit in the image forming method rendered obvious over the combined teachings of Iida, Waki, JP'331, and Suwabe. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides recording sheets with fixed toner images without offset and without wrinkles.

16. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iida combined with JP'331, Suwabe, Waki, and Hachisuka, as applied to claim 1 above, further combined with US 6,641,967 B2 (Takiguchi).

Iida combined with JP'331, Suwabe, Waki, and Hachisuka renders obvious an image forming method as described in paragraph 15 above, which is incorporated herein by reference.

As discussed in paragraph 15 above, Iida discloses forming the toner image on the receiving member by forming an electrostatic latent image on a photoconductor, developing the latent image with a two-component developer comprising a

magnetic carrier and a toner, and transferring the developed toner image to the recording medium.

Iida does not disclose that the latent image is developed with the toner by applying an alternating field as recited in instant claim 13.

Takiguchi discloses a method of developing an electrostatic latent image with a magnetic brush formed from a developer comprising a particular magnetic carrier and a toner having a weight average particle size of 1 to 9 μm. As discussed in paragraph 15 above, the toner particles in example 9 of Iida have a weight average particle size D4 of 4.1 μm, which meets the Takiguchi particle size requirement. Takiguchi teaches that the latent image is developed in a developing zone under the application of an alternating field. Col. 6, lines 7-15 and 42-62; col. 10, lines 60-65; col. 14, lines 34-37; and col. 15, lines 28-33. According to Takiguchi, the alternating field prevents the occurrence of carrier adhesion on the photoconductor. Col. 15, lines 27-33. Takiguchi further teaches that its developing method provides high quality images with less fog and toner scatter. Col. 6, lines 7-10.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Takiguchi, to develop the electrostatic latent image on the photoconductor

under the application of an alternating field with a magnetic brush comprising the particular carrier taught by Takiguchi in combination with the toner in the image forming method rendered obvious over the combined teachings of Iida, Waki, JP'331, Suwabe, and Hachisuka. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides recording sheets with high quality fixed toner images with less fog and toner scatter.

17. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach or suggest a method of fixing a toner image to a recording medium wherein the toner image is formed with a toner having the shape factor and particle size limitations recited in instant claim 1 and the modulus limitations recited in instant claim 8.

Iida teaches toners having a storage modulus at 80°C that is within the storage modulus range G'80 recited in instant claim 8. For example, cyan toner (4) in example 4 of Iida has a storage modulus at 80°C of $1.1 \times 10^8$ $dN/m^2$, i.e., $1.1 \times 10^7$ Pa. See Table 4-2, example 4. However, Iida does not teach or

suggest that its toners have a storage modulus at 180°C as recited in instant claim 8 or have the maximum loss tangent recited in instant claim 8. Nor is there enough information on the present record for a person having ordinary skill in the art to presumably presume that the Iida toners have such a storage modulus and a loss tangent as recited in instant claim 8.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Mr. Nam Nguyen, can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Janis L Dote

1700

JLD
Jul. 15, 2006